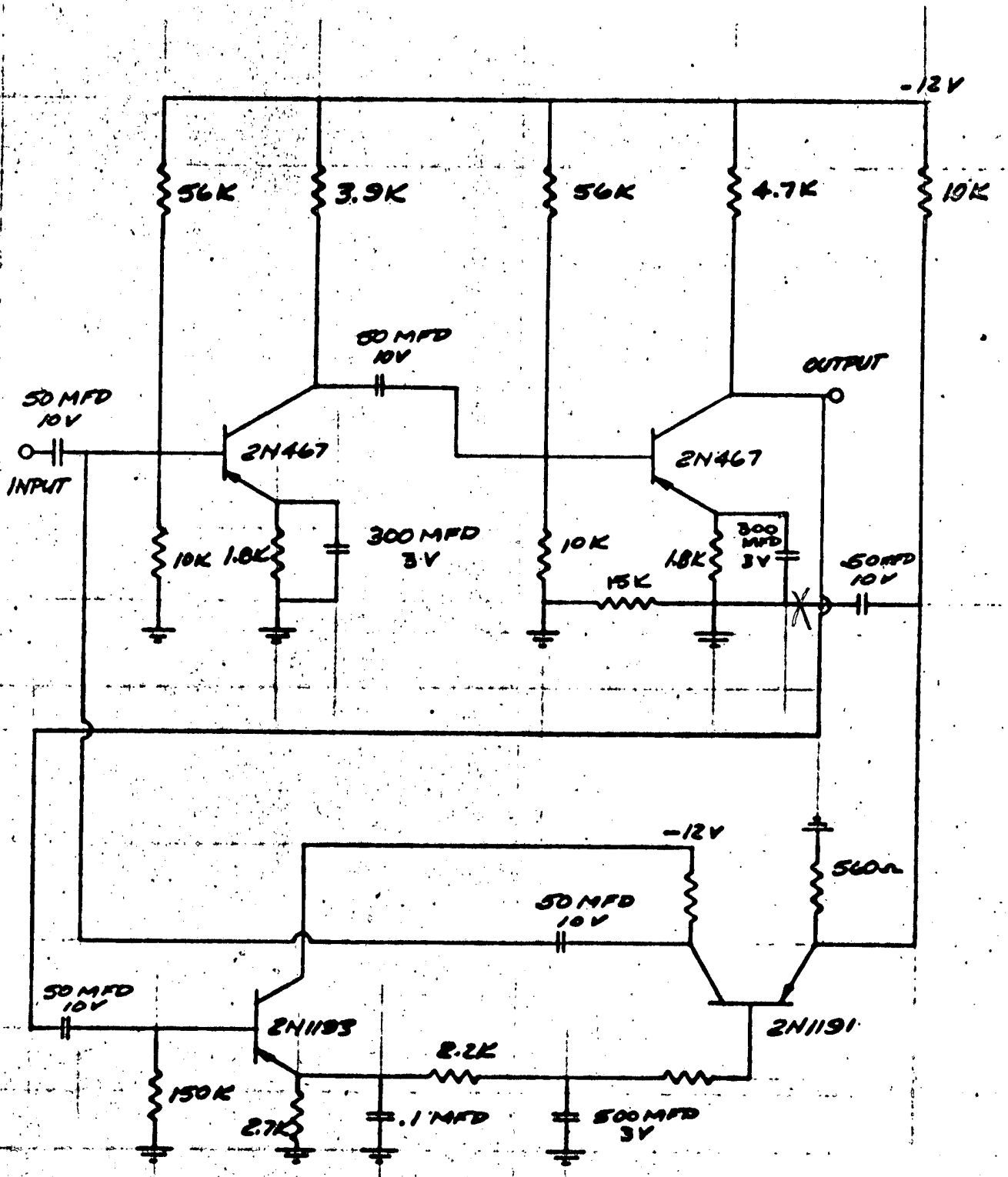
D 4



AUTOMATIC GAIN CONTROLLED AMPLIFIER
FIG. A-8

6a

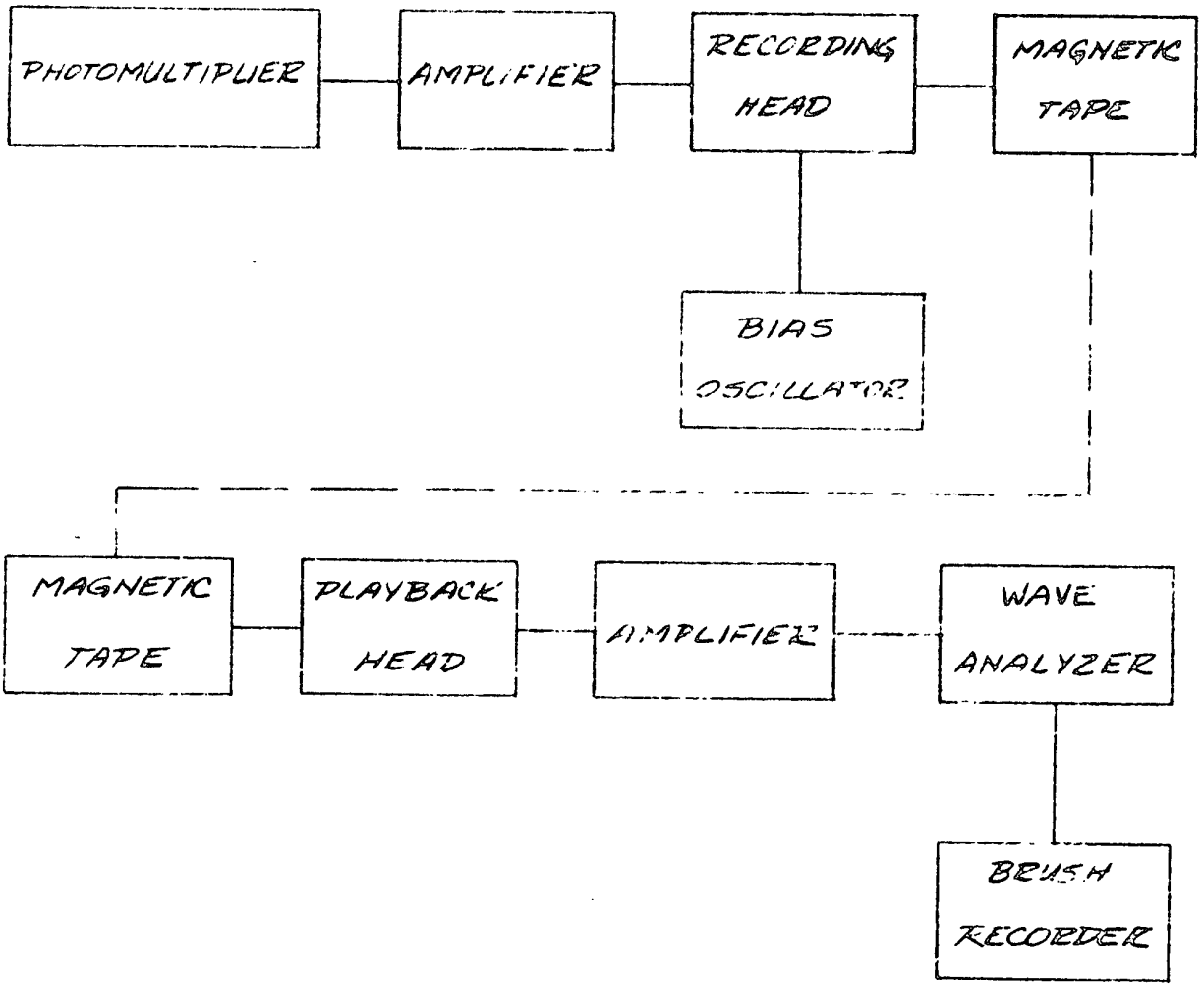
D 450

APPENDIX C

ELECTRONIC SCENE ANALYSIS

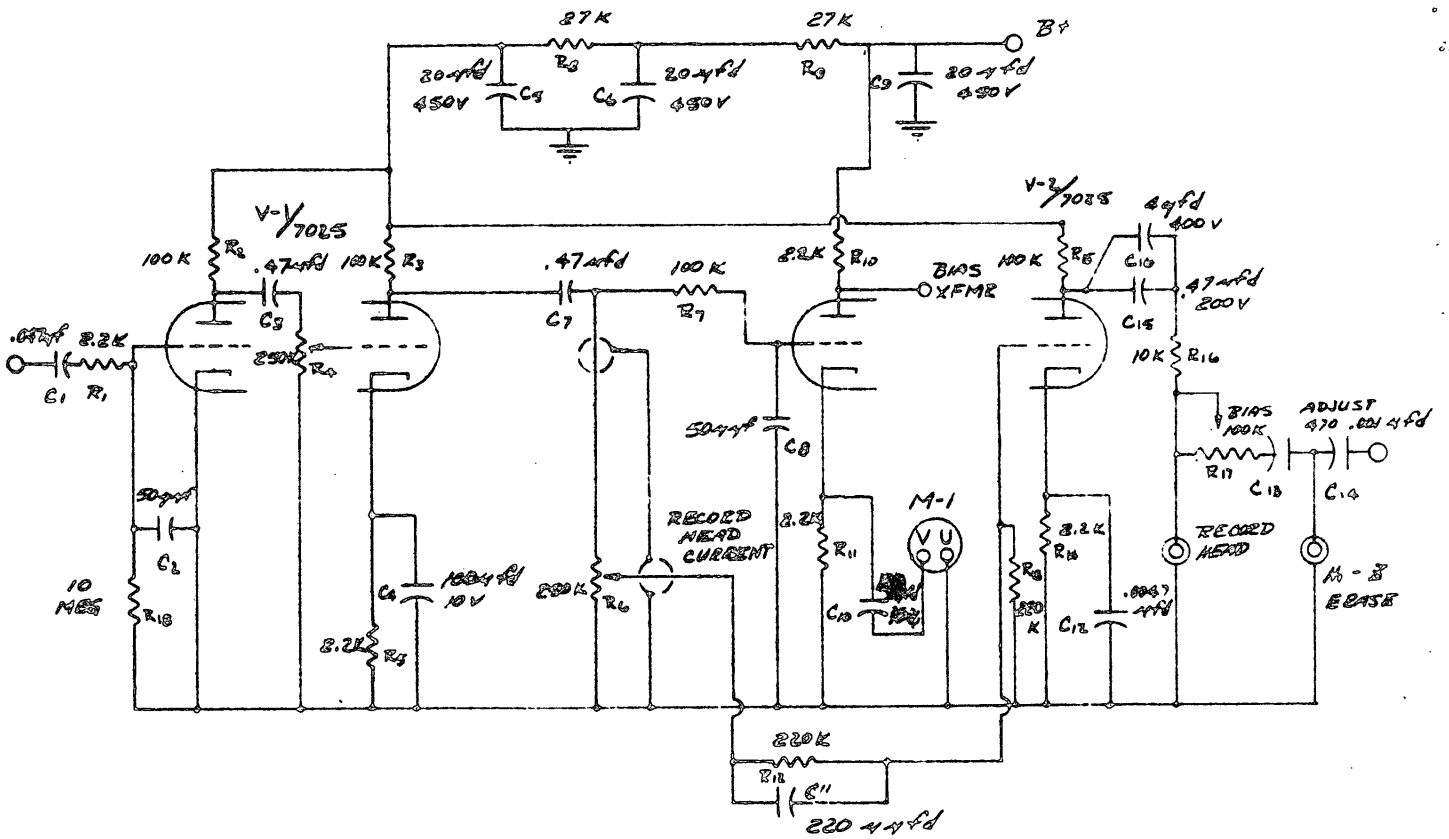
The essential elements of the electronic scene analyzer are shown in the block diagram, Figure C-1. A Leeds & Northrup microdensitometer has been modified to obtain a higher scanning speed than is normally obtained with this instrument. Normally the fastest scan speed is 5/6 mm per second. The temporal frequencies obtained from scanning a negative are given by the product of the scan speed times the spatial frequencies in the negative. For a range of spatial frequencies from 1 cycle per mm to 200 cycles per mm, the temporal range would be 5/6 cycles per second to 167 cycles per second. This is a difficult range for the direct recording process. This is possible to record with the FM process but the stability requirements on the transport mechanism become very stringent, and the mechanism becomes expensive. For example, a $\pm$ 0.2% variation in tape speed at a center frequency of 3000 cycles means a $\pm$ 12 cps variation in playback and recording which means an error of $\pm$ 10 cycles per mm in the measurement of the spectrum. Increasing the scanning speed to 14.6 mm per second increases the temporal frequency range to 14.6 - 2920 cycles per second. It is practical to record to 20 cycles per second and lower. The difficulty in the low frequency range is in reproduction. Hence, by recording at 3 3/4 inches per second and playing back at 7 1/2 inches per second, the temporal range becomes 29.2 to 5840 cycles per second. This is a very feasible range to work with.

A photomultiplier head was made for the L&N to replace the photo-tube pick-up supplied with this instrument. The signal from this photomultiplier is then amplified in the recording amplifier, Figure C-2, and recorded on standard 1/4 inch wide magnetic tape on a Viking series 85 Transport. A



ELECTRONIC SCENE ANALYZER

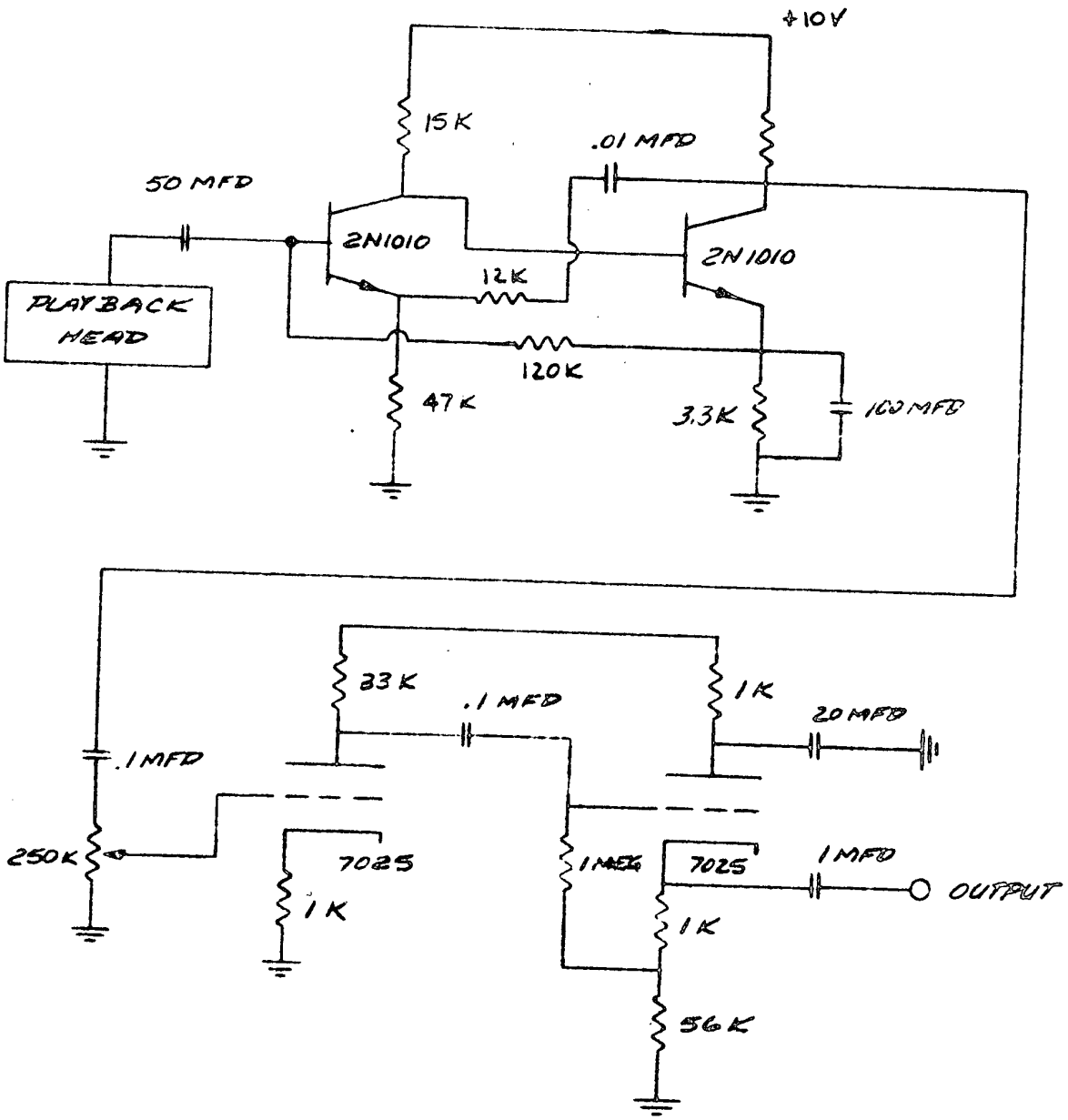
FIG. C-1



RECORD AMP.

FIG C-2

second playback head is used to simultaneously monitor the recording. The tape, which is used in the form of a 55-inch continuous loop, is then played back through the playback amplifier, Figure C-3. This signal is then put into the General Radio Wave Analyzer. The frequency selector dial of the wave analyzer is driven by a constant speed motor and the output of the analyzer is recorded on a Brush Mark II Recorder. The General Radio Wave Analyzer is not ideal for this work because the calibration of its frequency selector dial is not a linear function of angle of rotation. Thus, the frequency scale of the recordings is not linear and the recordings are cumbersome to interpret. This difficulty will be resolved by the use of the Hewlett Packard Wave Analyzer, which is being procured for this program. The frequency calibration of this instrument is a linear function of shaft rotation, so the frequency scale on the final recording is linear.



PLAYBACK AMPLIFIER SCHEMATIC

FIG. C-3